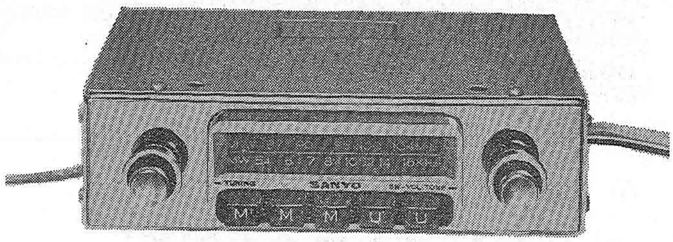
SANYO

11-Transistor, FM/AM-band Car Radio

MODEL F-8501

SERVICE MANUAL

SANYO ELECTRIC CO., LTD.
INTERNATIONAL DIVISION : SANYO ELECTRIC TRADING CO., LTD.
OSAKA, JAPAN.



SPECIFICATIONS

CIRCUIT SYSTEM ······11 transistors plus 8 diodes superheterodyne with RF amplification, manual tuning and push-button tuning.

FM SECTION

FREQUENCY RANGE ······87–108Mc
INTERMEDIATE FREQUENCY······10.7 Mc
OUTPUT POWER ······Undistorted 4.0W (12V) 2.0W (6V)
SENSITIVITY ······10 μV/m (for 500mW output with S/N 30dB)
SIGNAL TO NOISE RATIO······40dB (at 25 μV/m signal input)
FIDELITY ······100c/s –2dB
400c/s 0dB
6000c/s –13dB

AM SECTION

FREQUENCY RANGE······530–1,605 Kc
INTERMEDIATE FREQUENCY ······455 Kc
OUTPUT POWER ······Undistorted 4.0W (12V) 2.0W (6V)
Maximum 6.0W (12V) 3.0W (6V)
SENSITIVITY ······ 13 μV/m (for 500mW output)
SIGNAL TO NOISE RATIO···23dB(at 10Kc off tuning from 1000Kc)
FIDELITY ······100c/s –2dB
400c/s 0dB
4000c/s –12dB

POWER SUPPLY ······12V and 6V (Reversatbe polarity)

CURRENT DRAIN ······Nosignal 350mA(12V) 350mA(6V)
Maximum 1300mA(12V) 1500mA(6V)

LOUDSPEAKER ······ 5″×7″ permanent dynamic
Voice coil impedance 4 ohms

TRANSISTORS ······ 2SA440 FM RF Amp.
2SA440 FM Converter
2SA322 AM RF Amp.
2SA324 FM IF Amp. & AM Converter
2SA324 FM IF Amp. & AM IF Amp.
2SA324 FM IF Amp.
2SA324 FM IF Amp.
2SB186 Audio Amp.
2SB186 Audio Driver
2SB217×2 Power Amp. (pushpull)

DIODES ······1S994Y FM Regulatcr
1S188×2 FM AM AGC
1S188×2 FM Discriminator
1S188×2 FM Limiter
1S188 AM Detector

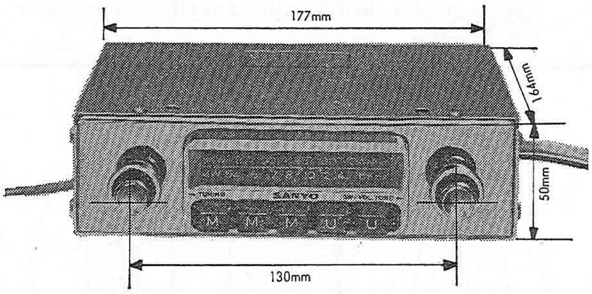
THERMISTORS ······SDT–02 Temperature compensator

DIMENSIONS ······Width 178 mm (7″)
Height 51 mm (2″)
Depth 157 mm (6¼″)

SHAFT SPACING······130mm (Distance between control shafts)

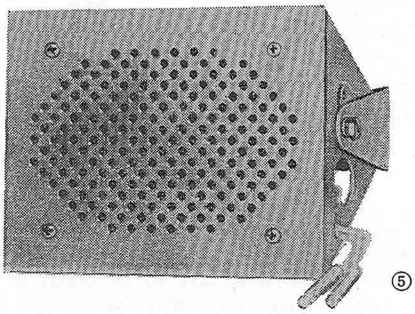
WEIGHT ······Radio unit 2.0kg (4.4 lbs.)
Speaker unit 0.8kg (1.8 lbs.)

CONSTRUCTIONS



STANDAPD ACCESSORIES

Refference Number	Items	Ratings	Q'ty
1	Noise suppressor resistor	R–R7006	5
2	Noise suppressor capacitor	R–C4005	2
3	Spare fuse	R–S1246	1
4	Mounting metal (Perforated)	R–111685	1
5	Oval speaker with box	Optional	1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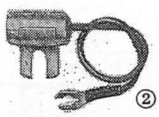
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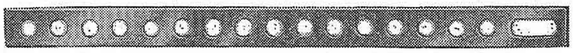
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POLARITY REVERSE

The polarity reversing plug must be positioned correctly before installing your radio or making any electrical connections to the radio.

Set the polarity plug to the positive position if the positive terminal of the battery is grounded to the car.

Set the polarity plug to the negative position if the negative terminal is grounded to the car.

Damage to the radio may result if polarity plug is not positioned correctly before operating.

ALIGNMENT PROCEDURES

A) AM SECTION

a) ANTENNA TRIMMER ADJUSTMENT

With radio installed in car and auto antenna fully extended, tune in a weak station near 1400Kc and adjust CT-3 for maximum output. (Fig. 1)

While this adjustment, one of AM push-buttons must be pushed in for AM operation.

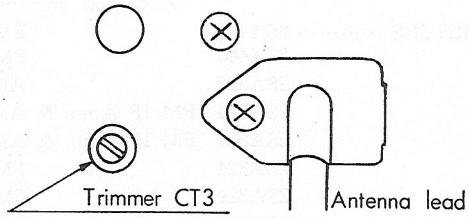


Fig. 1

b) ALIGNMENT PREPARATIONS

Check power supply voltage (13.2V) and ground polarity.

Signal generator output: Modulation frequency 400cps Percentage modulation 30%
Signal level just high enough to provide meter deflection.
Signal supply inlet: Antenna receptacle through the dummy.
Output meter connection: Across the speaker or dummy load (4 ohms).

STEP	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	ADJUST FOR MAXIMUM OUTPUT
IF ALIGNMENT				
1.	Thru dummy to antenna receptacle.	455Kc	Low frequency end stop	IF transformer T11, T12, T13, T14
RF ALIGNMENT				
2.	Thru dummy to antenna receptacle.	600Kc	600Kc	Oscillator coil T10
3.		1400Kc	1400Kc	Oscillator trimmer CT5
4.		1400Kc	1400Kc	Antenna trimmer CT3 RF trimmer CT4
*Repeat steps 1, 2,3 and 4.				

NOTE: Alignment is usually to be taken at points of 600Kc and 1400Kc, but it may be possible to obtain 530Kc to 1605Kc tuning range by adjusting at both lower and upper end of receiving band.

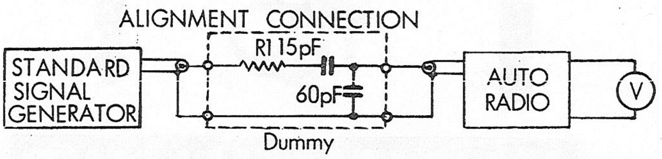


Fig. 2

B) FM SECTION

a) CURRENT ADJUSTING OF RF STAGE

Adjust the VR1 (100k) for the collector current of Tr1 (2SA440) to be 750μA.

b) FM IF ALIGNMENT (By vsing a sweep marker generator)

STEP	Generator Frequency	DIAL SETTING	HOW TO CONNECT S. M. G.	Elements to be Adjusted	ELEMENTS
1	10.7Mc	Point of no inter–ference	Output terminal to antenna. Input terminal to points Tp1 and Tp2.	T1 thru T8	Adjust for maximum gain and symmetric response curve as shown in Fig. 3 with marker on the top center.
2	10.7Mc	〃	Output terminal to antenna.. Input terminal to points of Tp1 and R29	T9	Adjust T9 to get crossover curves having striaghtness and to orient the marker at crossing Point (Fig. 4)

c) FM RF ALIGNMENT

Connect FM signal generator thru the dummy (Fig. 5) to antenna receptacle.

STEP	GENERATOR FREQUENCY	DIAL SETTING	REMARKS
3	86.5Mc	Lowest	Adjust CT2 for maximum gain.
4	94Mc	94Mc	Adjust CT1 for maximnm gain.
5	Confirm overall tuning range to be from 87Mc to 108Mc.		
	Repeat steps 1 thru 5 until no further improvement can be made.		

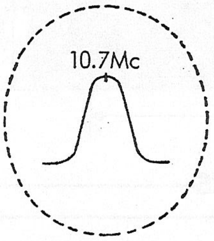


Fig. 3

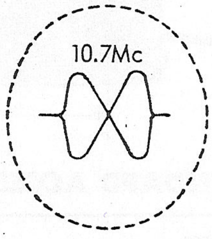


Fig. 4

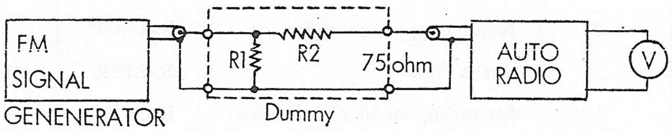
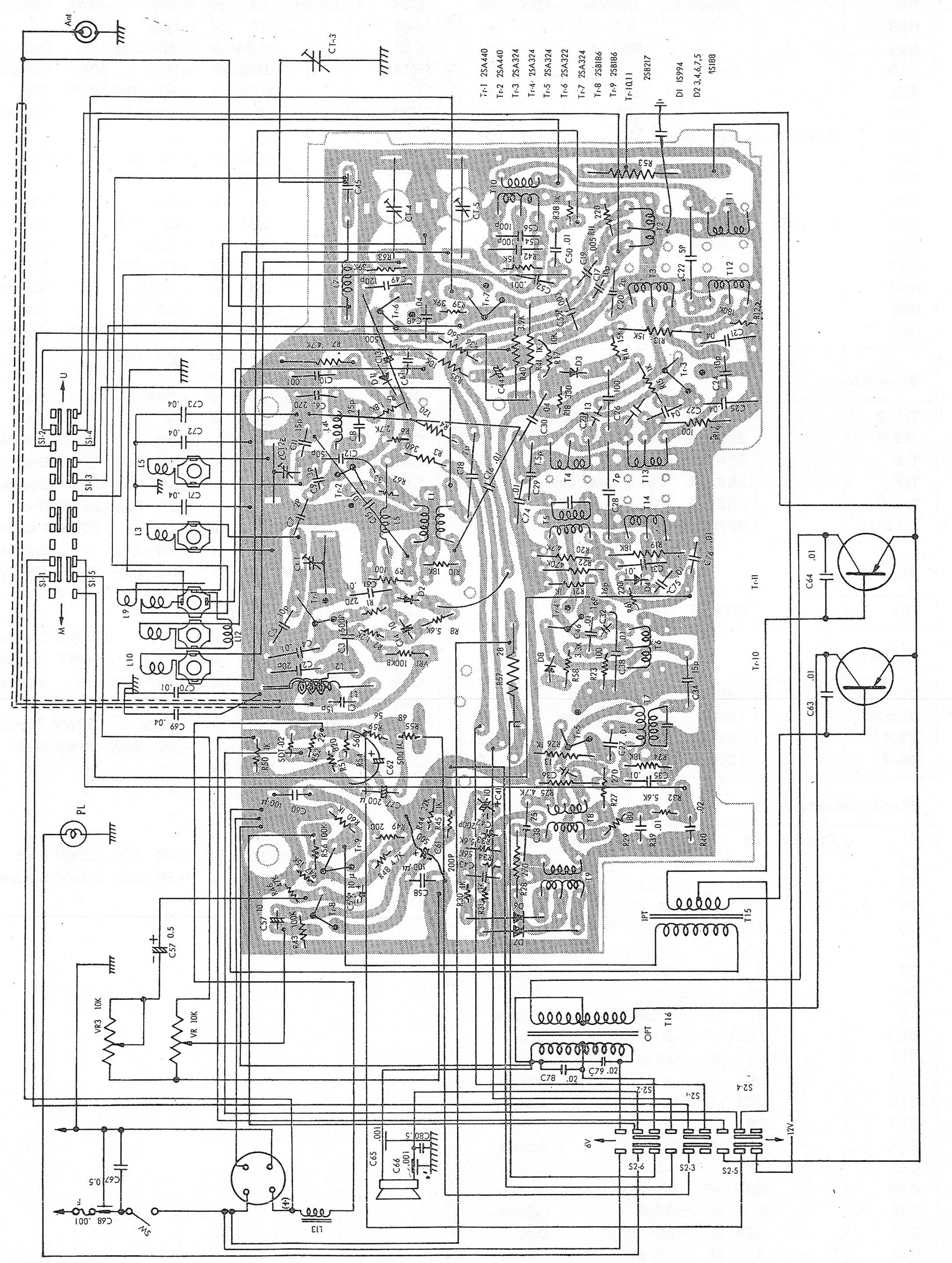


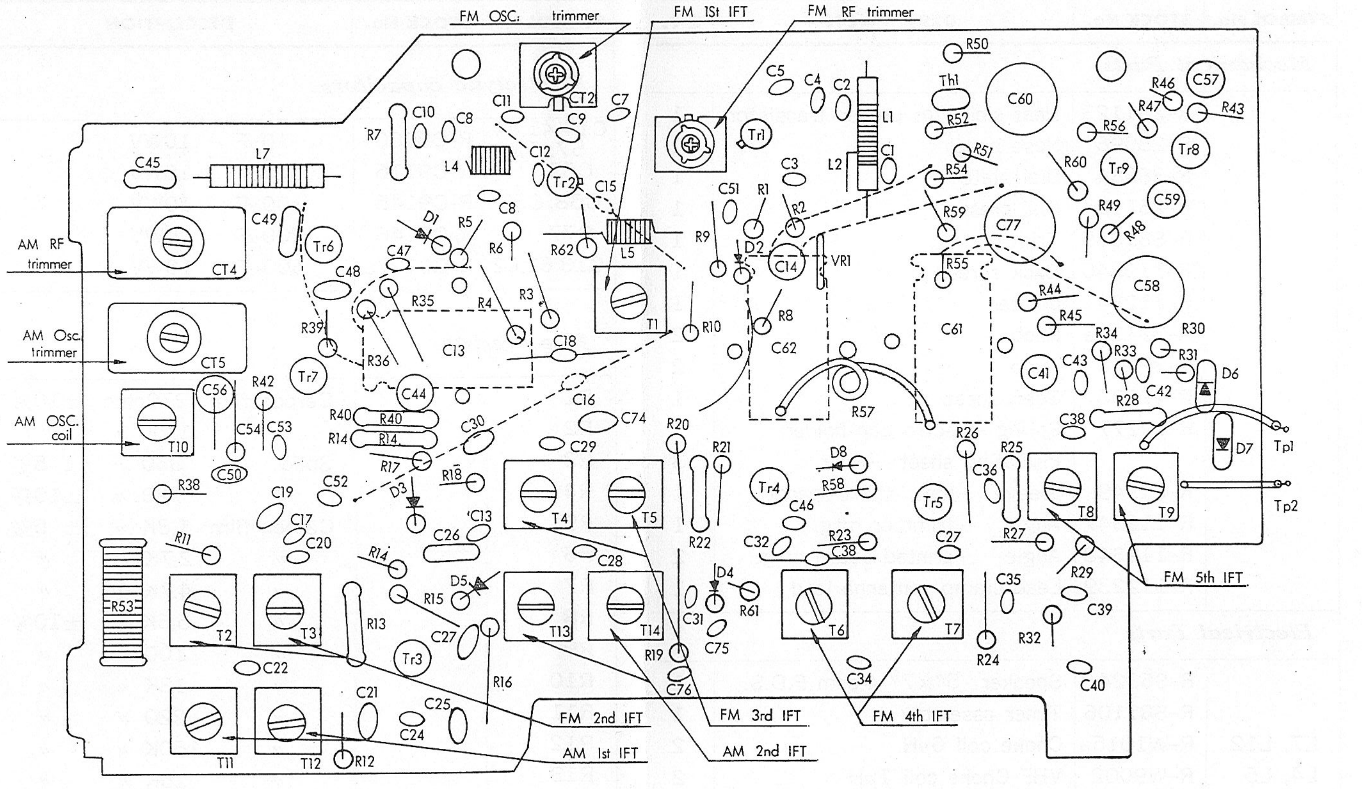
Fig. 5

INNER PARTS LOCATION



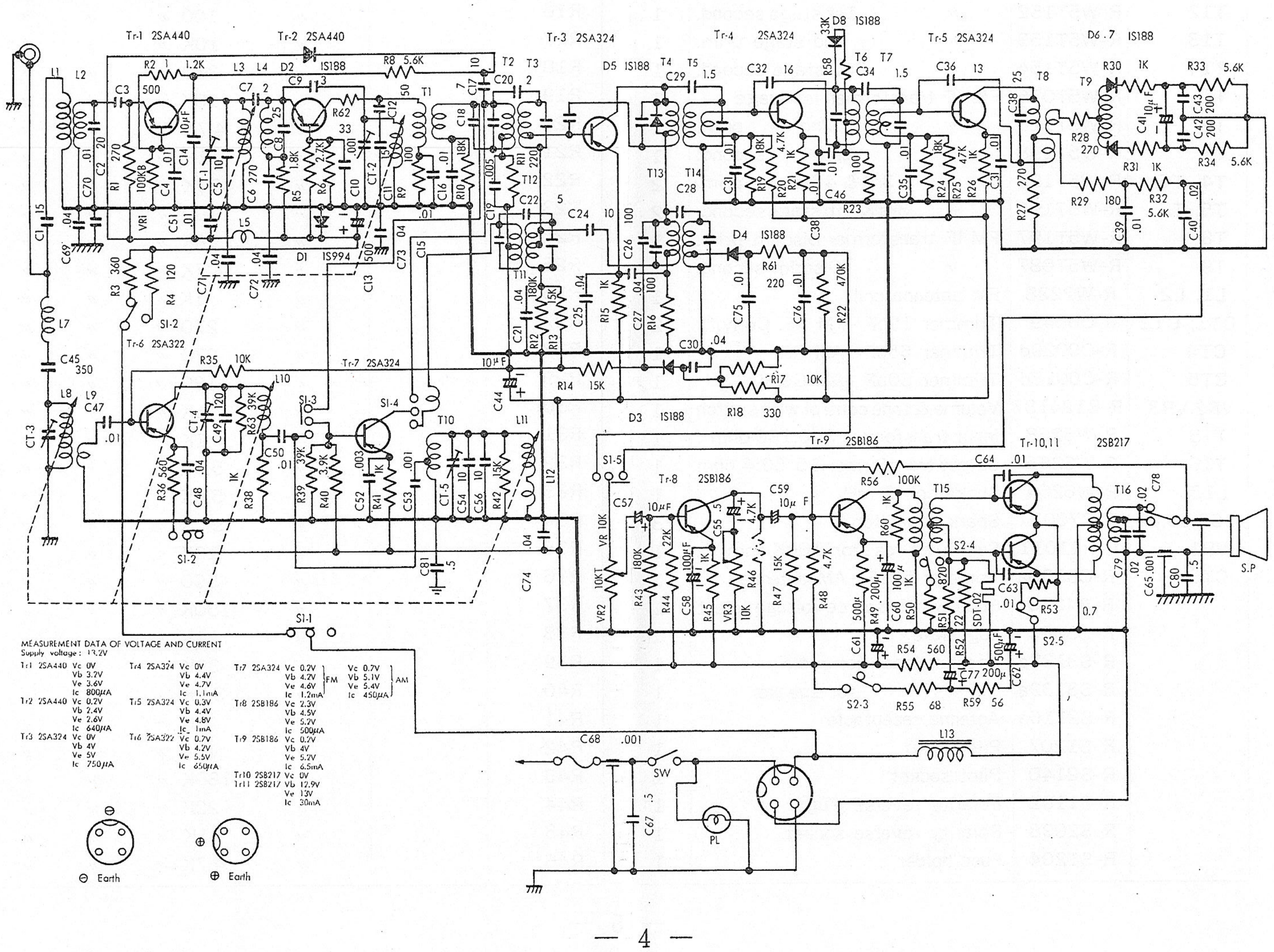
Ant
CT-3
Tr-1 2SA440
Tr-2 2SA440
Tr-3 2SA324
Tr-4 2SA324
Tr-5 2SA324
Tr-6 2SA322
Tr-7 2SA324
Tr-8 2SB186
Tr-9 2SB186
Tr-10,11 2SB217
D1 1S994
D2 3,4,6,7,5 1S188
PL
VR3 10K
VR 10K
C57 0.5
C67 0.5
C68 .001
SW
L13
C65 .001
C66 .001
C80 5
S2-6
S2-3
S2-5
S2-4
6V
12V
C78 .02
C79 .02
T16
OPT
IPT
T15
Tr-10
Tr-11
C63 .01
C64 .01

PARTS LOCATION



FM OSC. trimmer
FM 1St IFT
FM RF trimmer
AM RF trimmer
AM Osc. trimmer
AM OSC. coil
FM 2nd IFT
AM 1st IFT
FM 3rd IFT
AM 2nd IFT
FM 4th IFT
FM 5th IFT
Tp1
Tp2

CIRCUIT DIAGRAM



Tr-1 2SA440
Tr-2 2SA440
Tr-3 2SA324
Tr-4 2SA324
Tr-5 2SA324
Tr-6 2SA322
Tr-7 2SA324
Tr-8 2SB186
Tr-9 2SB186
Tr-10,11 2SB217
D1 1S994
D3 1S188
D4 1S188
D5 1S188
D6.7 1S188
D8 1S188
S.P
PL
SW
⊖ Earth
⊕ Earth

MEASUREMENT DATA OF VOLTAGE AND CURRENT
Supply voltage: 13.2V

Tr1	2SA440	Vc 0V	Vb 3.2V	Ve 3.6V	Ic 800μA
Tr2	2SA440	Vc 0.2V	Vb 2.4V	Ve 2.6V	Ic 640μA
Tr3	2SA324	Vc 0V	Vb 4V	Ve 5V	Ic 750μA
Tr4	2SA324	Vc 0V	Vb 4.4V	Ve 4.7V	Ic 1.1mA
Tr5	2SA324	Vc 0.3V	Vb 4.4V	Ve 4.8V	Ic 1mA
Tr6	2SA322	Vc 0.7V	Vb 4.2V	Ve 5.5V	Ic 650μA
Tr7	2SA324 FM	Vc 0.2V	Vb 4.2V	Ve 4.6V	Ic 1.2mA
	AM	Vc 0.7V	Vb 5.1V	Ve 5.4V	Ic 450μA
Tr8	2SB186	Vc 2.3V	Vb 4.5V	Ve 5.2V	Ic 500μA
Tr9	2SB186	Vc 0.2V	Vb 4V	Ve 5.2V	Ic 6.5mA
Tr10 Tr11	2SB217 2SB217	Vc 0V	Vb 12.9V	Ve 13V	Ic 30mA

PARTS LIST

SYMBOL No.	STOCK No.	DESCRIPTION	Q'ty
Mechanical Parts			
	R-261123	Heat sink -for power transistor	1
	R-28096	Nose panel	1
	R-38084	Dial plate	1
	R-261124	Dial press	1
	R-S81035	Trim plate	1
	R-112346	Back screen	1
	R-112341	pointer	1
	R-39139a	Knob	2
	R-39140	Knob	2
	R-47968	Spec. sheet	1
	R-12277	Spring -Electro cap·holder	3
		Insulating sheet -fiber	3
	R-24949	Sleeve -tuner shaft spacer	1
	R-112347	Angle -trimmer mtg.	1
	R-112348	Angle -printed board mtg.	2
	R-112239	Lead clamp -antenna lead	1
Electrical Parts			
	R-S6324	Speaker -5″×7″ 4 ohm P.D.S.	1
	R-S81106	Tuner assembly	1
L7, L12	R-W1015a	Choke coil 6μH	2
L4, L5	R-W9002	VHF Choke coil 1μH	2
T10	R-W8145	Oscillator coil -AM	1
T11	R-W5T151	AM IF transformer 1st stage prim.	1
T12	R-W5T152	〃 1st stage second.	1
T13	R-W5T153	〃 2nd stage prim.	1
T14	R-W5T154	〃 2nd stage second.	1
T1	R-W5T076	FM IF transformer lst stage	1
T2	R-W5T126	〃 2nd 〃 prim.	1
T3	R-W5T198	〃 2nd 〃 second.	1
T4, T6	R-W5T195	〃 3rd & 4th stage prim.	2
T5, T7	R-W5T196	〃 3rd & 4th stage second.	2
T8	R-W5T197	FM IF transformer Discrim prim.	1
T9	R-W5T087	〃 Discrim second.	1
L1, L2	R-W2228	FM antenna coil	1
CT1, CT2	R-C0049	Trimmer 10pF -FM RF. Conv.	2
CT4	R-C0029d	Trimmer 65pF -AM RF	1
CT5	R-C0028d	Trimmer 50pF -AM Conv.	1
VR2,VR3	R-R124137	Volume & tone control with switch	1
T15	R-W6268	Input transformer 300:130 ohm	1
T16	R-W6266	Output transformer 15/50:4 ohm	1
L13	R-W6264	Choke coil 2 mH	1
C65.66.68.	R-C7003	Spark capacitor	3
VR1	R-R11011	Semifixed resistor 100K ohm	1
CT3	R-C0038a	Trimmer 50pF -AM antenna	1
	R-S4290	Slide switch-source voltage select	1
	R-S3006	Lug plate	1
	R-S3138a	Speaker lead -for radio	1
	R-S3139a	〃 -for speaker	1
	R-S2116a	Antenna receptacle	1
	R-S1207	Pilot lamp	1
	R-S2140	Pilot socket	1
	R-S1102	Polarity reverse plug	1
	R-S2098	Polarity reverse socket	1
	R-S1204	Fuse holder	1

SYMBOL No.	STOCK No.	DESCRIPTION	Q'ty
Electrolytic capacitors			
C14.41.44 57. 59	R-C9060	10μF 10WV	5
C55	R-C9116	0.5μF 10WV	1
C58, C60	R-C9145	100μF 10WV	2
C77	R-C9146	200μF 10WV	1
C13.61.62	R-C9127a	500μF 15WV	3
Fixed resistor			
R1		Carbon film 270ohm ±10% ¼W	
R2		〃 1.2K 〃 〃 〃	
R3		Solid 360 〃 ± 5% ½W	
R4		〃 120 〃 ±10% 〃	
R5		Carbon film 1.8K 〃 ± 5% ¼W	
R6		〃 2.7K 〃 〃 〃	
R7		〃 4.7K 〃 〃 〃	
R8		〃 5.6K 〃 ±10% 〃	
R9		〃 100 〃 〃 〃	
R10		〃 18K 〃 〃 〃	
R11		〃 220 〃 〃 〃	
R12		〃 150K 〃 〃 〃	
R13		〃 15K 〃 〃 〃	
R14		〃 15K 〃 〃 〃	
R15		〃 1K 〃 〃 〃	
R16		〃 100 〃 〃 〃	
R17		〃 10K 〃 〃 〃	
R18		〃 330 〃 〃 〃	
R19		〃 18K 〃 〃 〃	
R20		〃 4.7K 〃 〃 〃	
R21		〃 1K 〃 〃 〃	
R22		〃 470K 〃 〃 〃	
R23		〃 100 〃 〃 〃	
R24		〃 18K 〃 〃 〃	
R25		〃 4.7K 〃 〃 〃	
R26		〃 1K 〃 〃 〃	
R27		〃 270 〃 〃 〃	
R28		〃 270 〃 〃 〃	
R29		〃 180 〃 〃 〃	
R30		〃 1K 〃 〃 〃	
R31		〃 1K 〃 〃 〃	
R32		〃 5.6K 〃 〃 〃	
R33		〃 5.6K 〃 〃 〃	
R34		〃 5.6K 〃 〃 〃	
R35		〃 10K 〃 〃 〃	
R36		〃 560 〃 〃 〃	
R37		〃 150K 〃 〃 〃	
R38		〃 1K 〃 〃 〃	
R39		〃 39K 〃 〃 〃	
R40		〃 3.9K 〃 〃 〃	
R41		〃 1K 〃 〃 〃	
R42		〃 15K 〃 〃 〃	
R43		〃 180K 〃 〃 〃	
R44		〃 22K 〃 〃 〃	
R45		〃 1K 〃 〃 〃	
R46		〃 4.7K 〃 〃 〃	

SYMBOL No.	STOCK No.	DESCRIPTION	
R47		Carbon film 15Kohm ±10% ¼W	
R48		〃 4.7 〃 〃 〃	
R49		〃 200 〃 〃 〃	
R50		Solid 1K 〃 〃 ½W	
R51		〃 820 〃 〃 〃	
R52		〃 22 〃 〃 〃	
R53	R-R7028	Wire Wound 0.7 〃 〃 1W	
R54		Carbon film 560 〃 〃 ¼W	
R55		〃 68 〃 〃 〃	
R56		〃 100K 〃 〃 〃	
R57	R-R7030	Flexible 28 〃 〃 4W	
R58		Carbon film 3.3K 〃 〃 ¼W	
R59		〃 56 〃 〃 〃	
R60		〃 1K 〃 〃 〃	
R61		〃 220 〃 〃 〃	
R62		〃 33 〃 〃 〃	
Transistor			
Tr1–2		2SA440 -FM RF. Conv.	2
Tr3–5		2SA324 -FM IF. AM IF.	3
Tr6		2SA322 -AM RF.	1
Tr7		2SA324 -FM IF AM conv.	1
Tr8–9		2SB186 -AF Amp. Driv.	2
Tr10–11		2SB217A -Power Amp.	2
Thermistor			
Th1		SDT-02 -temp. comp	1
Diode			
D1		1S994Y -FM regulated	1
D2.5.8.		1S188 -FM AGC limiter	3
D3–4		1S188 -AM ACC Det.	2
D6–7		1S188 -FM Discrim. (pair)	2
Fixed capacitors			
C1	Ceramic 15 pF ±10% 25WV Square		
C2	〃 20 〃 〃 〃 Disc		
C3	〃 500 〃 ±20% 50WV Square		
C4	〃 0.01 μF +80−20% 25WV Disc		
C5	〃 10 pF ±10% 500WV 〃		
C6	〃 270 〃 ±20% 25WV 〃		
C7	〃 2 〃 ±0.5 pF 〃 Square		
C8	〃 25 〃 ±10% 〃 Disc		
C9	〃 3 〃 ±0.5pF 〃 Square		
C10	〃 0.001 μF +80−20% 〃 Disc		
C11	〃 15 pF ±10% 500WV 〃		
C12	〃 50 〃 〃 50WV Square		
C15	〃 0.01 μF +80−20% 25WV Disc		
C16	〃 0.01 〃 〃 〃 〃		
C17	〃 10 pF ±1pF 〃 Square		
C18	〃 7 〃 ±0.5pF 〃 〃		
C19	〃 0.01 μF +80−20% 〃 Disc		
C20	〃 2 pF ±0.5pF 〃 Square		
C21	〃 0.04 μF +80−20% 〃 Disc		
C22	〃 3 pF ±0.5 pF 〃 Square		

SYMBOL No.	DESCRIPTION
C23	Ceramic 13 pF ±10% 25WV Square
C24	〃 10 〃 ±10% 〃 〃
C25	〃 0.04 μF +80−20% 〃 Disc
C26	〃 100p pF ±10% 50WV Insulated
C27	〃 0.04 μF +80−20% 25WV Disc
C28	〃 7 pF ±0.5pF 〃 Square
C29	〃 1.5 〃 〃 〃 〃
C30	〃 0.04 μF +80−20% 〃 Disc
C31	〃 0.01 〃 〃 〃 〃
C32	〃 16 pF ±10% 〃 Square
C33	〃 0.01 μF +80−20% 〃 Disc
C34	〃 1.5 pF ±0.5pF 〃 Square
C35	〃 0.01 μF +80−20% 〃 Disc
C36	〃 13 pF ±10% 〃 Square
C37	〃 0.01 μF +80−20% 〃 Disc
C38	〃 25 pF ±10% 50WV Square
C39	Mylar 0.01 μF +30−20% 〃 〃
C40	〃 0.02 〃 〃 〃 〃
C42	Ceramic 200 pF ±20% 〃 Disc
C43	〃 200 〃 〃 〃 〃
C45	〃 350 〃 ±5% 〃 Square
C46	〃 0.01 μF +80−20% 25WV Disc
C47	Mylar 0.01 〃 +30−20% 50WV Square
C48	Ceramic 0.04 〃 +80−20% 25WV Disc
C49	〃 120 pF ±10% 50WV Insulated
C50	Mylar 0.01 μF +30−20% 〃 Square
C51	Ceramic 0.01 〃 +80−20% 25WV Disc
C52	Mylar 0.005 〃 +30−20% 50WV Square
C53	〃 0.001 〃 〃 〃 〃
C54	Styrol 100 pF ±10% 125WV Tubular
C56	Ceramic 100 〃 〃 50WV Insulated
C63	Mylar 0.01 μF +30−20% 〃 Square
C64	〃 0.01 〃 〃 〃 〃
C67	M. P. 0.5 〃 ±20% 150WV Tubula
C69	Ceramic 0.04 〃 +80−20% 25WV Disc
C70	〃 0.01 〃 〃 〃 〃
C71	〃 0.01 〃 〃 〃 〃
C72	〃 0.01 〃 〃 〃 〃
C73	〃 0.01 〃 〃 〃 〃
C74	Ceramic 0.04 μF +80−20% 25WV Disc
C75	Mylar 0.01 〃 +30−20% 50WV Square
C76	〃 0.005 〃 〃 〃 〃

6-20054 Printed in Japan